

By Johnny J. Moye

# Real Integration—Where the Rubber Meets the Road

**“PUTTING CORE ACADEMICS INTO CONTEXT, CTE COURSES PROVIDE AN EXCELLENT PLATFORM FOR STUDENTS TO LEARN THE RELEVANCE OF SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) AS WELL AS LITERATURE, ARTS AND SOCIAL STUDIES.”**

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## **INTEGRATION OF CORE ACADEMICS INTO CAREER AND TECHNICAL EDUCATION**

(CTE) is not new. Integration already occurs and some programs have been very successful (Moye, 2008; Reese, 2003). Putting core academics into context, CTE courses provide an excellent platform for students to learn the relevance of science, technology, engineering and mathematics (STEM) as well as literature, arts and social studies. Students learn to use this information by applying it to real-world situations. Not only is integration a good idea, it is also a requirement if a school division uses federal Perkins Act funds, (Brustein, 2006). A teacher desiring to integrate core academic information into his or her CTE course needs to understand integration as well as what and how to integrate.

State and/or local school divisions determine the content of each CTE course. In Virginia, for example, courses are built upon frameworks. Teachers use these frameworks to develop their lessons, activities and assessments. These frameworks are built upon national academic standards such as mathematics (National Council on Teaching Mathematics, 2000) and science (American Association for the Advancement of Science (AAAS, 1993)) standards. When a CTE course is correctly taught, “Education should not be viewed as vocational versus academic. Vocational and academic are interrelated” (Cutshall, 2003). Once teachers understand the national standards in which their courses are built upon they can accomplish true integration. This

article will discuss two forms of integration, integrated curriculum and interdisciplinary curriculum. Both terms identify valuable approaches to integration

### **Understanding the Definitions**

A CTE teacher uses an integrated curriculum when he or she includes information from other courses to explain or support a lesson within his or her course. Using an integrated curriculum is a way to teach students that “attempts to break down barriers between subjects, and make learning more meaningful to students,” according to Connect 4 Education’s *Integrated Curriculum Guide*. An interdisciplinary curriculum is “an educational approach where students study a topic and its related issues in the context of various academic areas or disciplines,” according to the International Technology Education Association (ITEA, 2000, p. 239). “Interdisciplinary methods work to create connections between traditionally discrete disciplines such as math, the sciences, social studies or history, and English language arts,” according to Learn NC, a program of the University of North Carolina at Chapel Hill School of Education.

### **Getting Started**

The integrated curriculum method is probably the easiest method to start. A teacher should review his or her course framework and national standards to ensure that he or she specifically addresses the correct standards in their lessons. For example, one sixth- to eighth-grade geometry standard is to use visualization, spatial reasoning and geometric modeling



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to solve problems (NCTM, 2000). In Virginia, eighth-grade students learn these terms and principles in their math courses as well as in their technology education course. During instruction, and reinforced by a balsa bridge building activity, technology teachers use the same terminology and stress the same principles as do math teachers. Technology teachers should make every possible connection with the math course and inform students that what they are doing in the technology course is applying the information that they learned (or will learn) in their math course. The integrated approach simply uses the same terms and principles

that other courses present to students. A technology teacher could use the integration approach very easily. To realize the greatest success, the teacher should communicate with the math teacher(s) and learn specific uses of facts, figures and terminology. The teachers may then desire to start working more closely together and attempt an interdisciplinary approach to instruction.

CTE and core teachers must work closely together to use the interdisciplinary curriculum method. The method is beneficial when a student receives information in one course and that information is reinforced in another. For example,

a family and consumer sciences teacher will explain that food sources were once living organisms made of complex molecules, including carbohydrates, fats and proteins. The lesson would discuss the origin of foods but it would also address cellular composition, multi-cellular organisms, and ecosystems, all of which are middle school science standards (AAAS, 1993).

During the lesson, the culinary arts teacher would explain how these factors affect taste as well as how the human body reacts to them. Students would benefit the most if the culinary arts teacher would present this information concur-

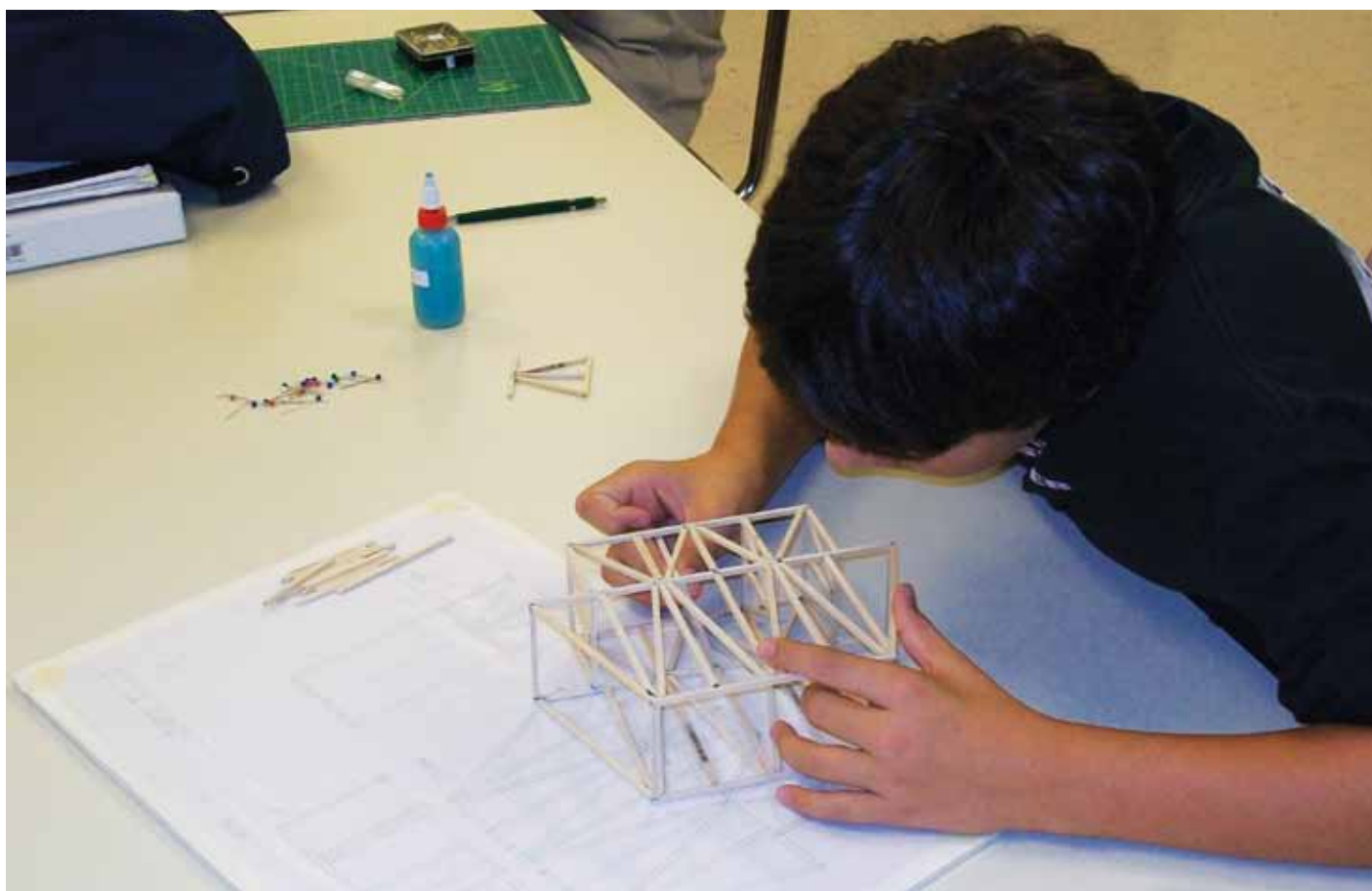


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- ▲ This eighth-grade student used mathematics, science and engineering principles to construct a balsa bridge.

rently with the earth science teacher. This interdisciplinary curriculum method requires close coordination between teachers. Students benefit because they can make connections between real-world actions and abstract information. Not all culinary arts students will be enrolled in an earth science course during the same semester. Many students will be enrolled in other courses. The most effective teachers will know the courses in which their students are enrolled, and what type of information should be presented in their course—and when to present it.

Teachers can present core academic information either horizontally or vertically. A teacher accomplishes horizontal integration by presenting information learned in another course during the

same grade or semester. Vertical integration occurs when a teacher presents information that students previously received or will receive in a subsequent course. Either form of integration takes proper planning and execution. Most educators and administrators understand this concept but understanding is only part of the equation. Teachers must know what, when and how to present specific information to improve students' core academic and CTE course success.

### Recommendations

**Start out simple**—Initially, producing integrated lessons may be overwhelming. Teachers should expound on current information and introduce new integrated coursework when he or she feels comfortable in doing so.

**Professional development**—Teachers need to perform research to determine current local, state and federal initiatives and use those resources. Learning and using correct integration techniques and terminology is also important. Once a teacher becomes better equipped, he or she can speak more convincingly to those who need to support the initiative. When discussing the initiative using correct terminology, teachers will receive assistance from other CTE teachers, core teachers, administrators, and school board members.

**Create a long-range plan**—Planning is essential. Integration is not a one- or two-year project. A successful teacher will create a plan to guide him or her for the rest of his or her teaching career. Start off easy and create a one- or two-year



## "LEARNING AND USING CORRECT INTEGRATION TECHNIQUES AND TERMINOLOGY IS ALSO IMPORTANT. ONCE A TEACHER BECOMES BETTER EQUIPPED, HE OR SHE CAN SPEAK MORE CONVINCINGLY TO THOSE WHO NEED TO SUPPORT THE INITIATIVE."

plan and then ask yourself; "Where do I want my program to be in 10 years?" Then, using the backward design method (Wiggins, and McTighe, 1998), determine the required actions between now and 10 years. Students', parents' and administrators' input is essential. Collect and use their input and your plan will be solid. Over the course of time, modify the plan as necessary; but the primary goal, real integration, should remain intact.

**Determine level of success**—Prudent decision makers base their decisions on data. In today's world of education, many decisions are made in response to standardized testing results. If students score high on their tests, decision makers feel that the current plan is working. Conversely, if students do not score well, then changes are made. CTE teachers with integrated courses can (or receive help to) perform studies that identify how their courses help improve students' core academic testing success.

For example, say that a culinary arts teacher included cellular information in her course and that information appeared in a standardized test; with the assistance of the earth science teacher, the CTE teacher could determine how her students

faired in answering those questions compared to an equal number of students who did not take the culinary arts course. If it was concluded that the culinary arts students performed better in that section of the standardized test, it could be inferred that the information students received in their CTE course helped them achieve better scores. This type of testing has been used to support CTE courses across the nation (Dugger and Johnson, 1992; Dyer, Reed, and Berry, 2006; Frazier, 2009; Scarborough and White, 1994).

### Looking ahead

Much has been written concerning the integration of core academics into CTE courses. This article only touches on the subject and was written to describe that successful integration is very achievable. It just takes time and effort to do what is

most beneficial for students. Real integration has been around for many years but it comes down to the teacher. Concerning real integration—teacher involvement and effort is where the rubber meets the road! **I**

**Editor's Note:** For more information on career and technical education and academic integration, see Research Report on page 52, "Crosswalks and Quality: Linking Mathematics Language and Career and Technical Education Standards."

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### Resources

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